USER MANUAL

Delta Battery Energizer

WARNING: READ ALL INSTRUCTIONS

speedrite™ by TRU-TEST®

ELECTRIC FENCING FOR THE SERIOUS FARMER

Contents

Electric fencing and your Speedrite energizer 1

Installation 2

Operation 2

Battery selection and management 5

Building a permanent electric fence 6

Temporary electric fencing 9

Safety considerations 9

Frequently asked questions/Troubleshooting 11

Servicing 11

Product specifications 12

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For more information about the Speedrite range of quality products, see *www.speedrite.com*.

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Electric fencing and your Speedrite energizer

Congratulations on your purchase of a Speedrite battery energizer. This product has been constructed using the latest technology and construction techniques. It has been engineered to give superior performance and many years of service.

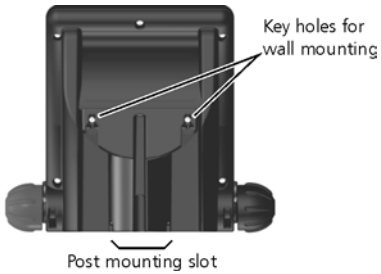
It is important to read these instructions carefully and thoroughly. They contain important safety information and will assist you in ensuring that your electric fencing system gives maximum performance and reliability.

Note:

- This product has been designed for use with electric animal fences.
- Keep this manual in a handy location.

Warning!

- Do not connect to mains-operated (line-operated) equipment.
- Switch the energizer off before installation or performing any work on the fence.
- Read all the safety considerations carefully. See *Safety Considerations* on page 9.
- Check your installation to ensure that it complies with all local safety regulations.
- Do not connect simultaneously to a fence and to any other device such as a cattle trainer or a poultry trainer. Otherwise, lightning striking your fence will be conducted to all other devices.



Symbols that may be on your energizer

CAUTION

To reduce the risk of electric shock, the energizer should be opened or repaired only by qualified Speedrite-appointed personnel.

Read full instructions before use.

How does an electric fence work?

An electric fence system comprises an energizer and an insulated fence. The energizer puts very short pulses of electricity onto the fence line. These pulses have a high voltage, but are of very short duration (less than 3/10,000ths of a second). However, a shock from an electric fence pulse is very uncomfortable and animals quickly learn to respect electric fences. An electric fence is not only a physical barrier, but is also a strong psychological barrier.

What are the benefits of an electric fence?

An electric fence has many benefits over conventional fencing:

- Requires less labour and material to construct than conventional fencing.
- Flexibility to change or add paddocks when required. The use of strip grazing techniques can allow temporary fencing to be quickly and easily erected or removed.
- Controls a broader range of animals.
- Minimises damage to expensive livestock when compared with other fencing mechanisms, for example barbed wire.

Installation

Read all of the safety instructions in this manual carefully before installing the energizer.

There are two types of installation:

- Solar installation
- Battery-only installation

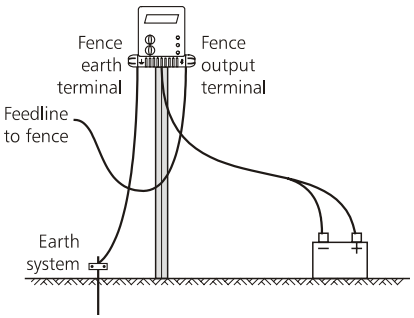
Solar installation

Solar panel selection, assembly and positioning

Refer to the Speedrite website *www.speedrite.com* for information about selecting components, assembling and positioning a solar energizer system.

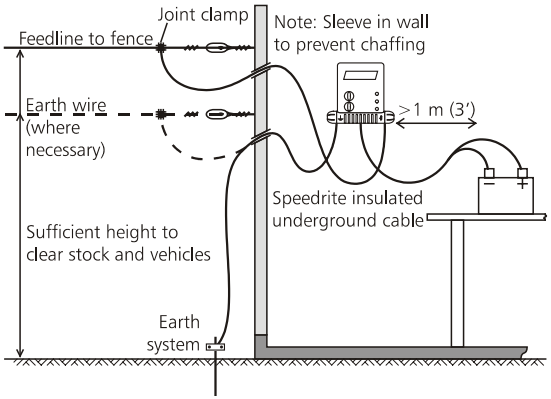
Battery-only installation

Exterior installations



For exterior installations, ensure that the energizer is protected from animals and the environment. If necessary, house the energizer in a protective box. Consider site access, proximity to a suitable area for earthing and whether the energizer is safe from human interference. For mounting on a post, use the post mounting slot on the back of the energizer case. Try to position the energizer as near as possible to the centre of the electric fence. To avoid possible damage to the energizer, ensure that the battery is at least 1 m (3') away from and not directly below the energizer. Attach the red (+) energizer clip to the positive terminal of the battery, and the black (–) clip to its negative terminal.

Interior installations

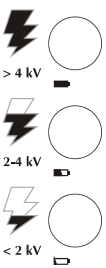

Joint clamp
Note: Sleeve in wall to prevent chaffing
Feedline to fence
Earth wire (where necessary)
>1 m (3')
Speedrite insulated underground cable
Sufficient height to clear stock and vehicles
Earth system

For interior installations, make sure the energizer and battery are level. Mount them above floor level and out of reach of children. For wall mounting, use the template printed inside the back cover of this manual. To avoid possible damage to the energizer, ensure that the battery is at least 1 m (3') away from and not directly below the energizer. Attach the red (+) energizer clip to the positive terminal of the battery, and the black (–) clip to its negative terminal.

Operation

Select the output setting using the Power Output switch (see *Power Output switch* on page 3).

One of the three output performance indicator lights will flash with each pulse. The lights indicate the approximate voltage at the Fence output terminals, except when the Power Output switch is set to Full Power with Battery Test.



Recommended.

Indicates a load on the energizer. Attention required to ensure reliable animal control.

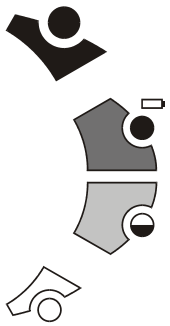
Fence is heavily loaded and needs urgent attention.

Note: If at any time all the indicator lights flash for more than 10 seconds, turn off the energizer for approximately 10 seconds, then turn it on again. If the indicator lights continue to flash, return the energizer to the nearest authorised service agent.

The energizer functions according to the position of the Power Output and Pulse Speed switches. See the diagram of the energizer on page 1.

Power output switch

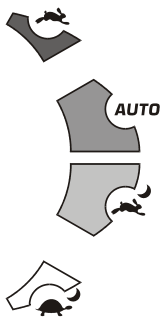
This switch controls the power output setting of the energizer.



Setting	Description
Full power	The energizer is operating at full output power.
Full power with battery test	The energizer is operating at full output power, but indicator lights show the battery level. See *Battery test setting* on page 4 for an explanation of the indicator lights.
Half power	The energizer is operating at approximately half the output power of the Full Power setting.
Off	The energizer is off and is not operating.

Pulse speed switch

This switch controls the output pulse speed and behaviour of the energizer. There are four settings:



Setting	Description
Fast	The energizer will pulse fast at all times.
Auto	The energizer will adjust its pulse speed to conserve battery power, depending on the battery charge level. See the table below.
Fast - nocturnal	The energizer will pulse fast at night and slow speed during the day (used where stock or predators are nocturnal). However, if the battery charge level is Low, the pulse speed during the day will change to being very slow.
Slow - nocturnal	The energizer will pulse at slow speed at night and fast speed during the day. However, if the battery charge level is Low, the pulse speed during the night will change to being very slow.

Note: In all switch positions, the energizer will stop functioning before the battery discharges completely. This helps to prevent battery damage.

Auto setting

When the Pulse Speed switch is set to Auto, the pulse speed varies according to the battery charge level.

Battery charge level	Pulse speed
Optimal	Fast – approximately 1½ seconds between pulses
Medium	Slow – approximately 2½ seconds between pulses
Low	Very slow – approximately 3½ seconds between pulses

Battery test setting

When the Power Output switch is set to Full Power with Battery Test, the indicator lights show the charge level of the battery and other battery information. The battery test is only relevant when a lead-acid battery is used. The table below explains what the indicator lights represent and any action required for each installation.

Lights	Battery-only installation	Solar installation
Green light on	Optimal battery charge level: • No action required.	Optimal battery charge level. (Readings for a solar installation are only accurate in the early morning or late evening when the solar panel has been out of the sunlight for several hours.)
Yellow light on	Medium battery charge level: • Monitor battery charge level. • Recharge the battery to avoid long term battery damage.	Low to Medium battery charge level: • Recharge the battery immediately. • Check the solar panel wiring is connected properly and is intact. • Check that the solar panel is installed correctly and is clean. If the problem recurs, the panel may be inadequate or faulty. Take the entire system to an authorised service agent for assessment.
Red light on	Low battery charge level: • Recharge the battery immediately.	Low battery charge level: • See Low to Medium battery charge level above
Green light flashing	Not applicable.	Battery connections may be faulty: • Check that the battery clips are connected properly and that the wiring is intact. Battery may be over-charged or faulty: • Disconnect the solar panel for 24 hours • Reconnect the solar panel and monitor for seven days. If the light flashes within seven days, there may be something wrong with the system. • Take the entire system to an authorised service agent for assessment.
Red light flashing	Battery may be faulty: • Recharge the battery and monitor battery performance for seven days. • If the light flashes within seven days, the battery should be checked by a battery specialist and replaced if necessary.	Battery may be faulty: • Recharge the battery and monitor battery performance for seven days. • If the light flashes within seven days, the battery should be checked by a battery specialist and replaced if necessary.

Battery selection and management

This section refers exclusively to rechargeable, lead-acid batteries, for example car, tractor, truck, marine or specialist deep-cycle batteries.

The battery you select will depend on whether your installation is a battery-only or a solar installation. For both types of installation, the position of the energizer selector switches will determine the size of battery and solar panel required. Refer to *Operation* on page 2 for an explanation of the function of the selector switches.

Battery selection for a battery-only installation

As a guide, the amp hour (Ah) rating of the 12 V lead-acid battery required for each model is shown below. This table is based on a 21 day operating period between battery charging. Although operating time can exceed 21 days, this is likely to cause battery damage and will necessitate frequent replacement of the battery. For best system reliability and long term battery life, the preferred battery and charging regime is to use a deep-cycle, lead-acid battery and to recharge it when it has discharged to Medium charge level. For more information on testing battery charge level, see *Battery test setting* on page 4.

Energizer Model	Selector Switch Positions	Current Required	Battery Capacity
Delta 1B	Full Power-Fast Pulse	70 mA	70 Ah
	Half Power-Fast Pulse	35 mA	35 Ah
Delta 2B	Full Power-Fast Pulse	140 mA	140 Ah
	Half Power-Fast Pulse	70 mA	70 Ah
Delta 3B	Full Power-Fast Pulse	340 mA	340 Ah
	Half Power-Fast Pulse	170 mA	170 Ah

Battery selection for a solar installation

The battery and solar panel must be selected carefully to suit the energizer's electrical current consumption. This will depend on the position of the energizer selector switches, the energizer model being used and the amount of sunshine at the location of the installation.

As a guide, the minimum amp hour (Ah) rating of the 12 V lead-acid battery required for each model is shown below. This table is based on average usage over seven days with no sunlight. It takes into account the variety of solar panel and regulator types that could be used in a solar installation. For more detailed information, refer to the Speedrite website *www.speedrite.com*.

Energizer Model	Selector Switch Positions	Current Required	Minimum Battery Capacity
Delta 1B	Full Power-Fast Pulse	70 mA	60 Ah
	Half Power-Fast Pulse	35 mA	60 Ah
Delta 2B	Full Power-Fast Pulse	140 mA	60 Ah
	Half Power-Fast Pulse	70 mA	60 Ah
Delta 3B	Full Power-Fast Pulse	340 mA	120 Ah
	Half Power-Fast Pulse	170 mA	60 Ah

Battery management

Warning! Batteries contain harmful chemicals and when used incorrectly, may cause injury. Observe the guidelines for battery care, maintenance and safety in this manual and in the documentation supplied with your battery.

Battery charging

Warning!
- Ensure that the battery is disconnected from the energizer before connecting the battery to any mains-operated (line-operated) battery charging device. Failure to observe this precaution could result in damage to the energizer and possible electrocution.
- When charging, ensure that there is adequate ventilation to allow gases to disperse.

A battery-only installation has unique requirements. Regular recharging of the battery is essential. Use a suitably rated battery charger to recharge the battery. Refer to the battery manufacturer's recommendations.

1 Disconnect the battery from the energizer.
2 Attach the positive (+) battery charger lead to the positive terminal of the battery, and the negative (–) battery charger lead to the negative terminal on the battery.
3 Insert the battery charger's input power plug into a mains or line socket and turn on the power supply.
4 After the battery is charged, disconnect it from the battery charger before connecting it to the energizer.

Caution! Over-charging the battery will reduce its life. Do not exceed the recommendations of the battery manufacturer on recharging the battery from a mains-powered (line-powered) source.

A correctly installed solar energizer system requires very little battery maintenance. The solar panel selected should be sufficient to maintain the battery at full or near-full charge.

Battery care and maintenance

- House the battery in a suitably designed battery box, if the battery is likely to be exposed to the weather.
- When not in use, keep the battery as fully charged as possible.
- Recharge a discharged battery as soon as possible.
- Batteries should be stored fully charged and recharged at regular intervals (every 8 weeks)
- Inspect the battery regularly to ensure that the electrolyte level does not fall below 12 mm (½") above the surface of the battery plates.
- Fill using deionised, distilled or rain water. Do not overfill. Refer to the battery manufacturer's recommendations for more information.

Battery safety

- Ensure that the battery is well ventilated when recharging.
- Avoid temperatures greater than 50 °C (120 °F).
- Ensure the battery is not exposed to naked flame or sparks.

Building a permanent electric fence

Components of an electric fence

An electric fence system comprises the following elements:

- *An energizer.*
- *An earth system.* This comprises a number of metal rods inserted into the ground, which are connected to the Fence earth terminal on the energizer.
- *Speedrite insulated underground cables.* Used to connect the energizer to the earth and fence.
- *An insulated fence.* Connected to the Fence output terminal of the energizer. Fences can be made to a variety of designs (see below).

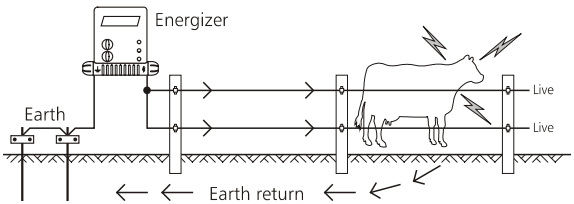
Other useful components that can be added:

Cut-out switches. Installed at regular intervals, these allow you to isolate sections of the fence for repair.

Lightning diverter kit. Used to minimise the damage to your energizer from lightning conducted down the fence line.

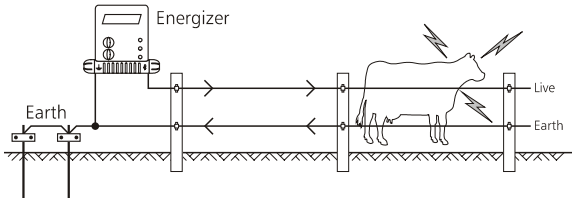
Typical installation

The animal receives a shock when it completes a circuit between the fence and the earth system. The fence below has all live wires and requires conductive soils. These fences are often referred to as 'all-live' or 'earth-return' fences.



Alternative installation

For poor conductivity soils (dry or sandy), a 'fence-return' or 'earth-wire-return' system is recommended. On these fences the Fence earth terminal is connected directly to at least one of the fence wires. The animal gets maximum shock from touching a live and earth wire at the same time.

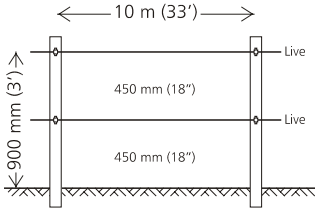


Fence designs

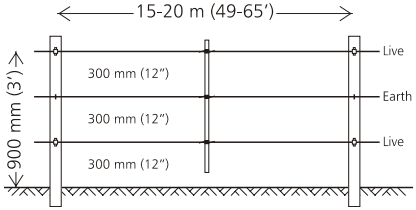
Fences can be constructed to suit the type of livestock and materials available. Discuss with your Speedrite distributor which design best suits your needs. Some suggested fence configurations are below.

Cattle and horses

10-15 m (33-49') spacing, posts only

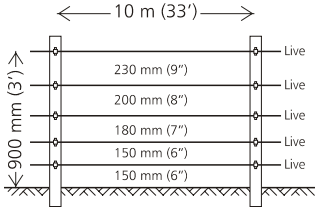


15-20 m (49-65') spacing with droppers

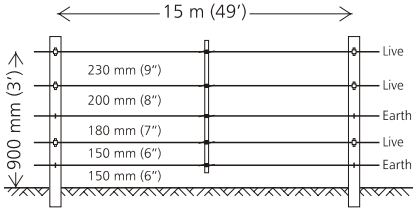


Sheep, goats, cattle and horses

10 m (33') spacing, posts only

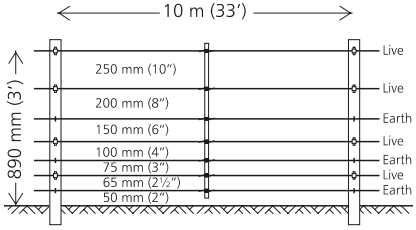


15 m (49') spacing with droppers



Wild animals

7 wire, 10 m (33') spacing with droppers



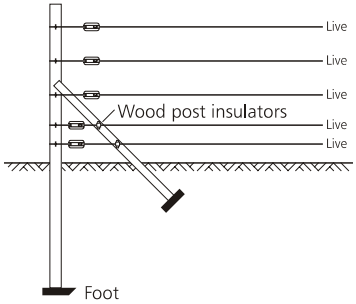
End assemblies

Angle stay

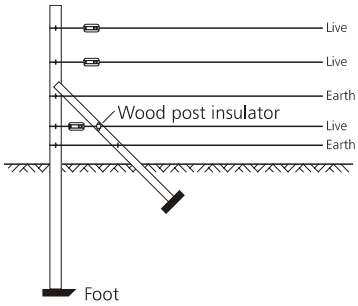
Suitable for field gate, high-tension strainer.

After firmly setting the footed strainer in the ground, dig in the stay block just below ground level, at a distance to ensure the angle stay will be held snugly in position. The stay can be levered into position with a spade.

All-live system



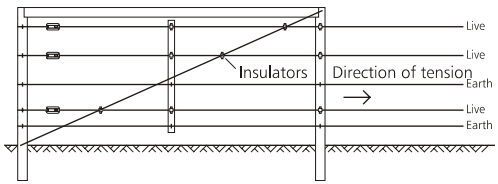
Earth-return system



Horizontal stay

Suitable for field gate, high-tension strainer.

Very simple to erect and most suitable as a high tension strainer, excellent in areas where the soil gets very wet or where heavy frost occurs.



Installing and testing an earth system

Select a suitable site for the earth system. Sites need to be:

- At least 10 m (33') from other earth systems (e.g. telephone, mains power or the earth system from another energizer).
- Away from stock or other traffic that could interfere with the installation.
- At a site that can be easily observed for maintenance.
- Ideally at a site that has damp soil (e.g. a shaded or swampy location). Note that the earth does not need to be directly adjacent to the energizer installation.

Drive Speedrite earth rods into the ground. Use high-voltage, insulated cable and earth clamps to continuously connect the earth rods and the energizer's Fence earth terminal. Make sure the insulation is stripped back to ensure good contact between the wire and the earth rod. The table below specifies the minimum number of 2 m (6'6") earth rods recommended for an earthing system:

Energizer	Earth rods
Delta 1B (0.5 J)	1
Delta 2B (1.0 J)	2
Delta 3B (2.5 J)	3

Test the earth system, using the following procedure:

1 Turn off the energizer.

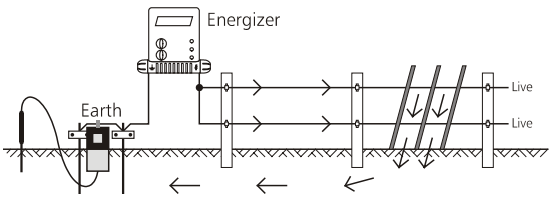
2 At least 100 m (330') away from the energizer, short circuit the fence by laying several steel rods or lengths of pipe against the fence. For best results, the fence voltage should be lowered to 2000 V or less. In dry or sandy conditions, it may be necessary to drive the rods up to 300 mm (12") into the earth.
Note: It is not acceptable to short-circuit a fence return system to the earth wire of the fence.

3 Turn the energizer back on.

4 Using a Speedrite Digital Voltmeter, ensure that the fence voltage is below 2 kV.

5 *Check your earth system.* Insert the voltmeter's earth probe into the ground at the full extent of the lead, and hold the hook against the last earth rod. The tester should not read more than 0.3 kV. Anything higher than this indicates that better earthing is required. Either add more earth rods or find a better ground area to drive in the earth rods.

Note: When earthing energizers located in dairies, earth at least 20 m (65') away from the dairy using double-insulated wire to avoid touching the dairy building or equipment.



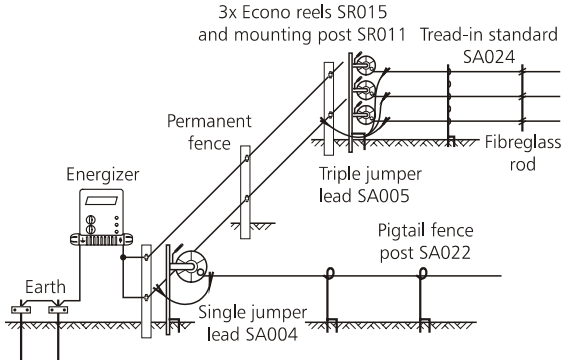
Temporary electric fencing

Speedrite offers a range of products that allow the farmer to construct a temporary electric fence. A temporary fence that can be quickly erected and easily moved allows the farmer to:

- Make smaller paddocks (fields)
- Keep herds of animals separated
- Ration feed

Note: Use more wires for smaller animals and wild animals. Politape should be used when greater visibility is required (e.g. horses).

An example of a temporary fence is shown below.



Safety considerations

Definition of special terms

Energizer – An appliance that is intended to periodically deliver voltage impulses to a fence connected to it.

Fence – A barrier for animals or for the purpose of security, comprising one or more conductors such as metal wires, rods or rails.

Electric fence – A barrier which includes one or more electric conductors, insulated from earth, to which electric pulses are applied by an energizer.

Fence circuit – All conductive parts or components within an energizer that are connected or are intended to be connected, galvanically, to the output terminals.

Earth electrode – Metal structure that is driven into the ground near an energizer and connected electrically to the Fence earth terminal of the energizer, and that is independent of other earthing arrangements.

Connecting lead – An electric conductor, used to connect the energizer to the electric fence or the earth electrode.

Electric animal fence – An electric fence used to contain animals within or exclude animals from a particular area.

Electric security fence – A fence used for security purposes which comprises an electric fence and a physical barrier electrically isolated from the electric fence.

Physical barrier – A barrier not less than 1.5 m (5') high intended to prevent inadvertent contact with the pulsed conductors of the electric fence. Physical barriers are typically constructed from vertical sheeting, rigid vertical bars, rigid mesh, rods or chainwire mesh.

Public access area – Any area where persons are protected from inadvertent contact with pulsed conductors by a physical barrier.

Pulsed conductors – Conductors which are subjected to high voltage pulses by the energizer.

Secure area – The side of an electric security fence where a person may come into contact with the electric fence, without the protection of a physical barrier.

Requirements for electric animal fences

Electric animal fences and their ancillary equipment shall be installed, operated and maintained in a manner that minimises danger to persons, animals or their surroundings.

This energizer is not intended for use by young children or infirm persons unless they have been adequately supervised by a responsible person to ensure that they can use the energizer safely.

Young children should be supervised to ensure that they do not play with the energizer.

Electric animal fence constructions that are likely to lead to the entanglement of animals or persons shall be avoided.

An electric animal fence shall not be supplied from two separate energizers or from independent fence circuits of the same energizer.

For any two separate electric animal fences, each supplied from a separate energizer independently timed, the distance between the wires of the two electric animal fences shall be at least 2 m (6'6"). If this gap is to be closed, this shall be effected by means of electrically non-conductive material or an isolated metal barrier.

Barbed wire or razor wire shall not be electrified by an energizer.

A non-electrified fence incorporating barbed wire or razor wire may be used to support one or more offset electrified wires of an electric animal fence. The supporting devices for the electrified wires shall be constructed so as to ensure that these wires are positioned at a minimum distance of 150 mm (6") from the vertical plane of the non-electrified wires. The barbed wire and razor wire shall be earthed at regular intervals.

Follow our recommendations regarding earthing. See *Installing and testing an earth system* on page 8.

A distance of at least 10 m (33') shall be maintained between the energizer earth electrode and any other earthing system connected parts such as the power supply system protective earth or the telecommunication system earth.

Connecting leads that are run inside buildings shall be effectively insulated from the earthed structural parts of the building. This may be achieved by using insulated high voltage cable.

Connecting leads that are run underground shall be run in conduit of insulating material or else insulated high voltage cable shall be used. Care must be taken to avoid damage to the connecting leads due to the effects of animal hooves or vehicle wheels sinking into the ground.

Connecting leads shall not be installed in the same conduit as the mains supply wiring, communication cables or data cables.

Connecting leads and electric animal fence wires shall not cross above overhead power or communication lines.

Crossings with overhead power lines shall be avoided wherever possible. If such a crossing cannot be avoided it shall be made underneath the power line and as nearly as possible at right angles to it.

If connecting leads and electric animal fence wires are installed near an overhead power line, the clearances shall not be less than those shown in the table below.

Minimum clearances from power lines for electric animal fences

Power line voltage	**Clearance**
≤1000 V	3 m (10')
>1000 V to ≤33,000 V	4 m (13')
>33,000 V	8 m (27')

If connecting leads and electric animal fence wires are installed near an overhead power line, their height above the ground shall not exceed 3 m (10'). This height applies to either side of the orthogonal projection of the outermost conductors of the power line on the ground surface, for a distance of:

- 2 m (6'6") for power lines operating at a nominal voltage not exceeding 1000 V.
- 15 m (50') for power lines operating at a nominal voltage exceeding 1000 V.

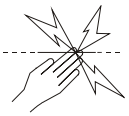
Electric animal fences intended for deterring birds, household pet containment or training animals such as cows need only be supplied from low output energizers to obtain satisfactory and safe performance.

In electric animal fences intended for deterring birds from roosting on buildings, no electric fence wire shall be connected to the energizer earth electrode. A warning sign shall be fitted to every point where persons may gain ready access to the conductors.

Where an electric animal fence crosses a public pathway, a non-electrified gate shall be incorporated in the electric animal fence at that point or a crossing by means of stiles shall be provided. At any such crossing, the adjacent electrified wires shall carry warning signs.

Any part of an electric animal fence that is installed along a public road or pathway shall be identified at frequent intervals by warning signs securely fastened to the fence posts or firmly clamped to the fence wires.

- The size of the warning sign shall be at least 100x200 mm (4x8").
- The background colour of both sides of the warning sign shall be yellow. The inscription on the sign shall be black and shall be either:



  or the substance of "CAUTION: Electric animal fence".
- The inscription shall be indelible, inscribed on both sides of the warning sign and have a height of at least 25 mm (1").

Ensure that all mains-operated, ancillary equipment connected to the electric animal fence circuit provides a degree of isolation between the fence circuit and the supply mains equivalent to that provided by the energizer.

Protection from the weather shall be provided for the ancillary equipment unless this equipment is certified by the manufacturer as being suitable for use outdoors, and is of a type with a minimum degree of protection IPX4.

Frequently asked questions/Troubleshooting

What voltage is required to control animals?

4 kV is widely accepted as the recommended minimum voltage to control animals. However, you also require a well constructed fence system to ensure that animals cannot push through electrified wires.

The fence voltage is below 4 kV. How do I increase the voltage?

Check the energizer. Ensure that the energizer is not set to operate at half power. Disconnect the energizer from the fence and earth system. Measure the voltage across the energizer terminals with a Speedrite Fault Finder, DVM or Lite Tester. If the voltage is less than 6 kV, request your Speedrite service agent to check the energizer.

Check the energizer earthing. Use the procedure described in *Installing and testing an earth system* on page 8.

Check your fence system for faults. The most common source of low voltage is faults on the fence line.

If the fence, earth and energizer are in good condition and the voltage is still below 4 kV, talk to your Speedrite distributor. They will help you identify whether recent extensions to your fence, a poor fence layout, or soil conditions may be causing inadequate voltage.

How do I locate faults?

The recommended tool for locating faults is the Speedrite Fault Finder. This combined voltage and current meter allows you to rapidly locate sources of current leakage. Alternatively, use a Speedrite DVM or Lite Tester. Use cut-out switches to turn off the power to different sections of the farm. If the voltage on the fence increases when a section of the farm is turned off, then investigate that section for possible faults.

There are no lights flashing on the energizer.

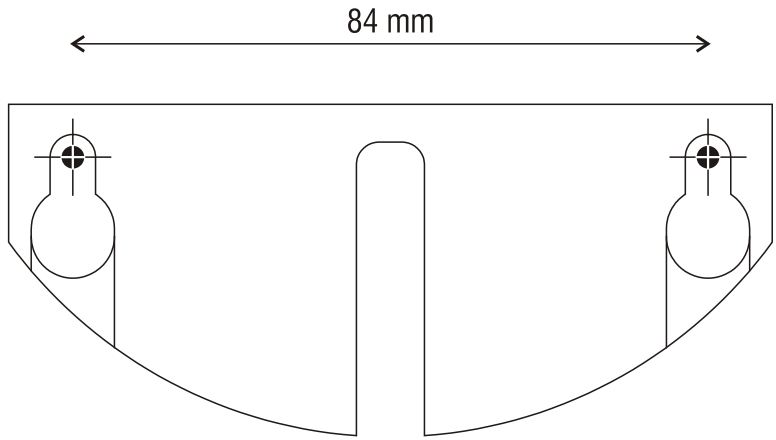
Check the power supply. Ensure that the power is switched on. If the energizer still does not operate, request your Speedrite service agent to check the energizer.

Servicing

This energizer contains no user serviceable parts. It must be returned to a Speedrite-appointed service agent for repair. If the supply cord is damaged it must only be replaced by a Speedrite-appointed service agent, as a special cord is required.

Product specifications

	Delta 1B	Delta 2B	Delta 3B
Power Supply	12 V battery (optional solar panel)	12 V battery (optional solar panel)	12 V battery (optional solar panel)
Current Consumption			
Fast-Full Power	70 mA	140 mA	340 mA
Fast-Half Power	35 mA	70 mA	170 mA
Maximum Output Voltage	7.9 kV	8.4 kV	8.4 kV
Maximum Output Energy	0.5 J at 700 Ω	1.0 J at 400 Ω	2.5 J at 200 Ω
Stored Energy	0.8 J	1.7 J	4.1 J
Dimensions WxHxD	240x200x118 mm (9½x8x4¾")	240x200x118 mm (9½x8x4¾")	240x200x118 mm (9½x8x4¾")
Weight	1.37 kg (3 lb)	1.37 kg (3 lb)	1.37 kg (3 lb)


84 mm

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